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Metadata specification for the collection 4 L01b data processing of the Ozone Monitoring Instrument

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1 Introduction

1.1 Identification

This document, identified by AURA-OMI-KNMI-L01B-007-SD contains the metadata specification of the OMI Level-1b (L1b) data products. The metadata specification is based on *ISO 19115 International Geographic Metadata Standard* [1] together with the *ISO 19115-2 extension for imagery and gridded data* [2] and the *Earth Observation Metadata profile of Observations and Measurements* [3][4]. In addition, the CF/NetCDF conventions [5][6] are described.

1.2 Purpose and objective

The OMI L01b processor developed by KNMI produces L1b data products from L0 input data and auxiliary data products. The OMI L1b data products distinguish radiance, irradiance and calibration data. A common data format for all OMI L1b products has been defined based on NetCDF. The data specification of these products is defined in the IODS [7]. A more detailed description of the L01b processor itself can be found in the ATBD [8].

This document addresses the specific tailoring of the metadata specifications [4] and [1] for the OMI L1b data products.

1.3 Document overview

This document describes the metadata related to the official products that are the result from the Level 0 to Level 1b processing of the data collected by OMI on-board the NASA EOS-Aura satellite. Section 4 describes the conventions and standards used as a basis for the metadata. Section 5 gives the details on the profiling of the metadata standards for OMI.

2 Reference documents

[1] Geographic Information – Metadata.
source: ISO; **ref:** ISO 19115:2003(E); **issue:** First Edition; **date:** 2003-05-01.

[2] Geographic Information - Metadata - Part 2: Extensions for imagery and gridded data.
source: ISO; **ref:** ISO 19115-2:2009(E); **issue:** First Edition; **date:** 2009-02-15.

[3] Earth Observation Metadata profile of Observations Measurements.
source: OGC; **ref:** OGC 10-157r3; **issue:** 1.0; **date:** 2012-06-12.

[4] Earth Observation Metadata profile of Observations Measurements.
source: OGC; **ref:** OGC 10-157r4; **issue:** 1.0.3-DRAFT; **date:** 2014-01-10.

[5] URL `http://www.unidata.ucar.edu/software/netcdf/docs/`.

[6] NetCDF Climate and Forecast (CF) Metadata Conventions.
source: CFConventions; **ref:** n/a; **issue:** 1.6; **date:** 2011-12-05.

[7] Input output data specification for the collection 4 L01b data processing of the Ozone Monitoring Instrument.
source: KNMI; **ref:** AURA-OMI-KNMI-L01B-0005-SD.

[8] Algorithm Theoretical Basis Document for the collection 4 L01b data processing of the Ozone Monitoring Instrument.
source: KNMI; **ref:** AURA-OMI-KNMI-L01B-0002-SD.

[9] INSPIRE Metadata Implementing Rules: Technical Guidelines based on EN ISO 19115 and EN ISO 19119.
source: EC JRC; **ref:** MD_IR_and_ISO_v1_2_20100616; **issue:** 1.2; **date:** 2010-06-16.

[10] URL `http://wiki.esipfed.org/index.php/Category:Attribute_Conventions_Dataset_Discovery`.

[11] Geographic Information – Observations and Measurements.
source: ISO; **ref:** ISO 19156:2011(E); **date:** 2011-12-20.

[12] Geographic Information – Metadata - XML schema implementation.
source: ISO; **ref:** ISO/TS 19139:2007(E); **date:** 2007-04-15.

[13] Observations and Measurements - XML Implementation.
source: OGC; **ref:** OGC 10-025r1; **issue:** 2.0; **date:** 2011-03-22.

[14] Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE).
source: EC; **ref:** Directive 2007/2/EC; **date:** 2007-03-14.

[15] INSPIRE Metadata Regulation, Commission Regulation (EC), No1205/2008.
source: EC; **ref:** Commission Regulation (EC) No 1205/2008; **date:** 2008-12-03.

[16] Geographic Information – Metadata - XML schema implementation - Part 2: Extensions for imagery and gridded data.
source: ISO; **ref:** ISO/TS 19139-2:2012(E); **date:** 2012-12-15.

[17] EO Product Collection, Service and Sensor Discovery using the CS-W ebRIM Catalogue.
source: OGC; **ref:** OGC 11-035r1; **issue:** 1.0; **date:** 2013-03-26.

[18] URL `http://wiki.esipfed.org/index.php/NetCDF,_HDF,_and_ISO_Metadata`.

[19] OGC Catalogue Services Standard 2.0 Extension Package for ebRIM Application Profile: Earth Observation Products.
source: OGC; **ref:** OGC 06-131r6; **issue:** 1.0.0; **date:** 2010-02-10.

[20] Definition identifier URNs in OGC namespace.
source: OGC; **ref:** OGC 07-092r3; **issue:** 1.2.1; **date:** 2009-01-15.

[21] OpenGIS Implementation Specification for Geographic information - Simple feature access - Part 1: Common architecture.
source: OGC; **ref:** OGC 06-103r4; **issue:** 1.2.1; **date:** 2011-05-28.

3 Terms, definitions and abbreviated terms

Terms, definitions and abbreviated terms can be found in [8]. Terms specific to this document can be found below.

3.1 Terms and definitions

There are no terms and definitions specific to this document.

3.2 Acronyms and Abbreviations

There are no acronyms and abbreviations specific to this document.

4 Metadata models

4.1 Introduction

The purpose of this section is to present a description of the conventions and the standards and to present the rationale for the selected implementation of metadata information into the L1b product. The baseline for providing metadata for the L1b product is formed by the ISO 19115 International Geographic Metadata Standard [1] together with the ISO 19115-2 extension for imagery and gridded data [2] and Earth Observation Metadata profile of Observations & Measurements (OGC 10-157 [3][4]). These standards are leading as prescribed by INSPIRE [9].

In specifying the metadata for the OMI L1b products several metadata conventions and standards are taken into account. Two relevant conventions are related to the use of NetCDF as file format for the L1b products: the NetCDF Climate and Forecast (CF) Metadata Conventions [6] and the Attribute Convention for Data Discovery (ACDD) [10] (governed by the Federation of Earth Science Information Partners (ESIP), which is an open networked community).

In addition, two ISO standards are important that are related to the description of collections of Earth Observation (EO) products (ISO 19115-2 [2]) and to the description of individual EO products (ISO 19156 [11]), respectively. The ISO 19115-2 and ISO 19156 are conceptual models that do not provide any encoding. Encoding standards for these models are documented in ISO 19139 [12], OGC 10-025 [13] and OGC 10-157 [3][4], providing XML implementation schemas for describing, validating and exchanging metadata about geographic datasets and for observations and measurements.

As shown in the input/output data specification document [7], metadata are included into the NetCDF L1b product as global attributes and as attributes organized into groups-of-groups, based on their intended use. It will facilitate the easy extraction of metadata and creation of XML documents according to the relevant schemata. However, it is important to note that only those attributes are included in the NetCDF L1b product for which the information is known at production time; missing metadata relating to, for instance, archiving are to be added when the actual metadata files (in XML) are generated. It is the responsibility of the facility that generates the metadata files to provide the missing metadata items and to ensure that the metadata files are valid and conform to the standard.

4.2 ISO 19115-2 metadata model

The core ISO standard for documenting geospatial data is the ISO 19115 International Geographic Metadata Standard [1]. The objective of this International Standard is to provide a structure for describing digital geographic data. The standard defines the schema required for describing geographic information and services. It provides information about the identification, the extent, the quality, the spatial and temporal schema, spatial reference, and distribution of digital geographic data.

Imagery and gridded data are important information sources and products used within a geospatial environment. The ISO 19115-2 standard [2] provides an extension to ISO 19115 by defining the schema required for describing imagery and gridded data. It provides information about the properties of the measuring equipment used to acquire the data, the geometry of the measuring process employed by the equipment, and the production process used to digitize the raw data.

The ISO metadata model consists of both optional and mandatory metadata elements; the major metadata objects are shown in the UML diagram of the root class MI_Metadata presented in Figure 1. Figure 2 shows the UML diagram of the MD_DataIdentification class and the relationship with other classes. A short description of the meaning of the different major ISO metadata objects is provided in Table 1.

ISO Object	Description
MI_Metadata	Root element that contains information about the metadata itself.
MI_AcquisitionInformation	Information about instruments, platforms, operations and other element of data acquisition.
MD_ContentInformation	Information about the physical parameters and other attributes contained in a resource.
MD_Distribution	Information about who makes a resource available and how to get it.
DQ_DataQuality	Information about the quality and lineage of a resource.
MD_SpatialRepresentation	Information about the geospatial representation of a resource.

ISO Object	Description
MD_ReferenceSystem	Information about the spatial and temporal reference systems used in the resource.
MD_MetadataExtensionInformation	Information about user specified extensions to the metadata standard used to describe the resource.
MD_ApplicationSchemaInformation	Information about the application schema used to build a dataset.
MD_PortrayalCatalogueReference	Information identifying portrayal catalogs used for the resource.
MD_MaintenanceInformation	Information about maintenance of the metadata and the resource it describes.
MD_Constraints	Information about constraints on the use of the metadata and the resource it describes.
MD_Identification	Information about constraints on the use of the metadata and the resource it describes.
MD_AggregateInformation	Information about groups that the resource belongs to.
MD_Keywords	Information about discipline, themes, locations, and times included in the resource.
MD_Format	Information about formats that the resource is available in.
MD_Usage	Information about how the resource has been used and identified limitations.
MD_BrowseGraphic	Information about graphical representations of the resource.

Table 1: Description of ISO objects.

The metadata objects and the information elements contained therein form an extensive set of which most of the time only a subset will be used. Because it is essential that a basic minimum of elements is used, the ISO standard provides a list (see Figure 3) of the core metadata elements (mandatory and recommended optional) required for describing and identifying a dataset, typically for catalog purposes. An “M” indicates that the element is mandatory. An “O” indicates that the element is optional. A “C” indicates that the element is mandatory under certain conditions. Many of the elements are shown in the UML diagrams presented in Figures 1 and 2.

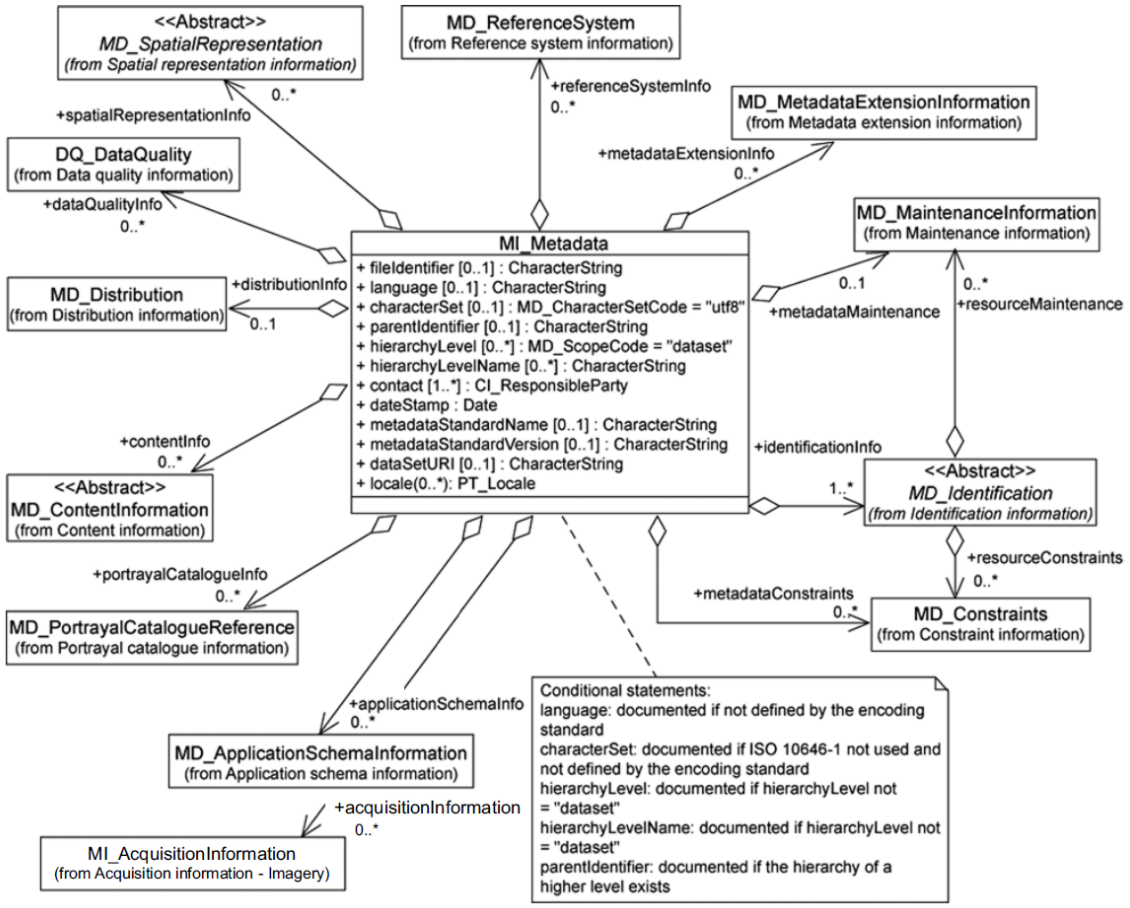

Figure 1: UML diagram of the root class MI_Metadata showing the major metadata classes (see: [1], [2])

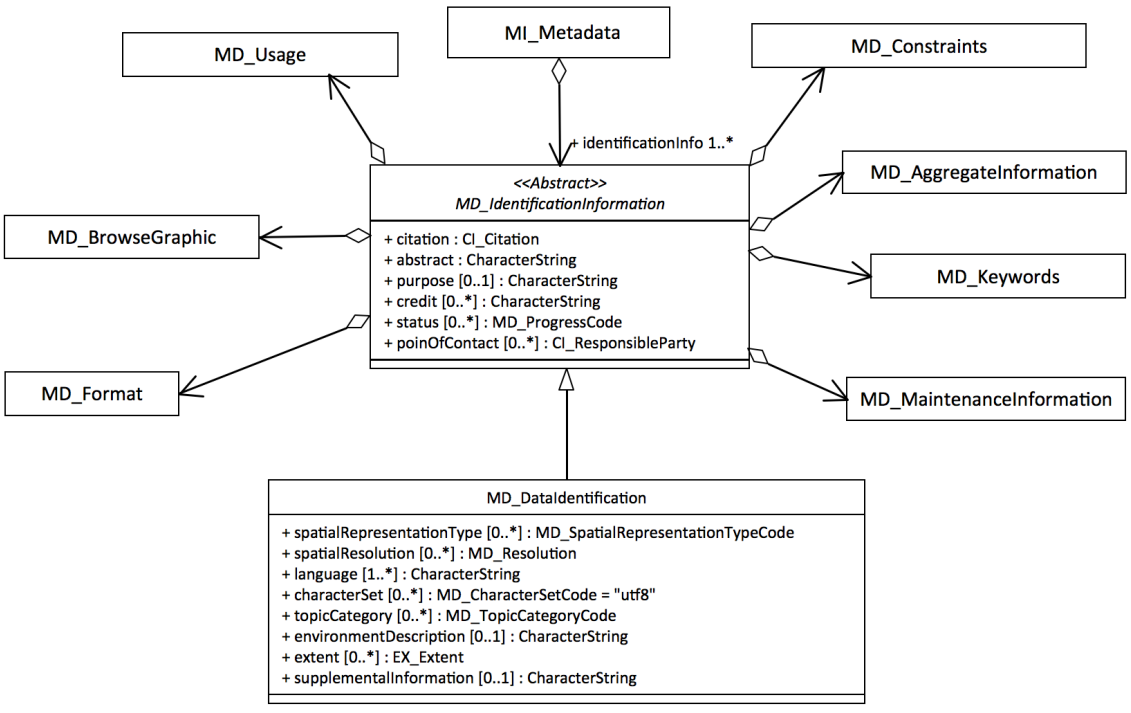

Figure 2: UML diagram of the MD_DataIdentification class (see: [1], [2])

Dataset title (M) (MD_Metadata > MD_DataIdentification.citation > CI_Citation.title)	**Spatial representation type** (O) (MD_Metadata > MD_DataIdentification.spatialRepresentationType)
Dataset reference date (M) (MD_Metadata > MD_DataIdentification.citation > CI_Citation.date)	**Reference system** (O) (MD_Metadata > MD_ReferenceSystem)
Dataset responsible party (O) (MD_Metadata > MD_DataIdentification.pointOfContact > CI_ResponsibleParty)	**Lineage** (O) (MD_Metadata > DQ_DataQuality.lineage > LI_Lineage)
Geographic location of the dataset (by four coordinates or by geographic identifier) (C) (MD_Metadata > MD_DataIdentification.extent > EX_Extent > EX_GeographicExtent > EX_GeographicBoundingBox or EX_GeographicDescription)	**On-line resource** (O) (MD_Metadata > MD_Distribution > MD_DigitalTransferOption.onLine > CI_OnlineResource)
Dataset language (M) (MD_Metadata > MD_DataIdentification.language)	**Metadata file identifier** (O) (MD_Metadata.fileIdentifier)
Dataset character set (C) (MD_Metadata > MD_DataIdentification.characterSet)	**Metadata standard name** (O) (MD_Metadata.metadataStandardName)
Dataset topic category (M) (MD_Metadata > MD_DataIdentification.topicCategory)	**Metadata standard version** (O) (MD_Metadata.metadataStandardVersion)
Spatial resolution of the dataset (O) (MD_Metadata > MD_DataIdentification.spatialResolution > MD_Resolution.equivalentScale or MD_Resolution.distance)	**Metadata language** (C) (MD_Metadata.language)
Abstract describing the dataset (M) (MD_Metadata > MD_DataIdentification.abstract)	**Metadata character set** (C) (MD_Metadata.characterSet)
Distribution format (O) (MD_Metadata > MD_Distribution > MD_Format.name and MD_Format.version)	**Metadata point of contact** (M) (MD_Metadata.contact > CI_ResponsibleParty)
Additional extent information for the dataset (vertical and temporal) (O) (MD_Metadata > MD_DataIdentification.extent > EX_Extent > EX_TemporalExtent or EX_VerticalExtent)	**Metadata date stamp** (M) (MD_Metadata.dateStamp)

Figure 3: Core set of ISO 19115 elements (from [1]).

4.3 INSPIRE metadata implementation rules

The Infrastructure for Spatial Information in the European Community (INSPIRE) directive [14] came into force on 15 May 2007 and will be implemented in various stages, with full implementation required by 2019. The INSPIRE directive aims to create a European Union (EU) spatial data infrastructure. This will enable the sharing of environmental spatial information among public sector organizations and better facilitate public access to spatial information across Europe.

To ensure that the spatial data infrastructures of the Member States are compatible and usable in a Community and trans-boundary context, the Directive requires that common Implementing Rules (IR) are adopted in a number of specific areas (Metadata, Data Specifications, Network Services, Data and Service Sharing and Monitoring and Reporting).

With respect to metadata the EC issued the INSPIRE Metadata Regulation No 1205/2008 [15]. This Regulation sets out the requirements for the creation and maintenance of metadata for spatial data sets, spatial data set series and spatial data services corresponding to the themes listed in the annexes of the regulation.

The INSPIRE Metadata Implementing Rules [9] aim to define how the Regulation can be implemented using ISO 19115 (and ISO 19119, which is out of scope in the context of this document), describing for each element of the Regulation its relation with the mentioned European standards. The document presents a comparison of the core requirements of ISO 19115 (see Figure 3) and the requirements of INSPIRE for spatial dataset and spatial dataset series as defined in the implementing rules for metadata. The conclusions of this comparison are:

- "The conformance of an ISO 19115 metadata set to the ISO 19115 Core does not guarantee the conformance to INSPIRE;"
- "The use of these guidelines to create INSPIRE metadata ensures that the metadata is not in conflict with ISO 19115. However, full conformance to ISO 19115 implies the provision of additional metadata elements which are not required by INSPIRE."

An initial list is presented of INSPIRE constraints applicable to an ISO 19115 metadata set (i.e. an instance of MD_Metadata [1]) describing a resource:

1. MD_Metadata.language is mandatory;
2. MD_Metadata.hierarchyLevel is mandatory;
3. INSPIRE only considers the first instance of MD_Metadata.hierarchyLevel (i.e. MD_Metadata.hierarchyLevel[1]) when there are many;
4. If the value of MD_Metadata.hierarchyLevel[1] is not service, dataset or series, the metadata set is out of scope of the directive;
5. When there are many instances of MD_Metadata.identificationInfo, only the first one (i.e. MD_Metadata.identificationInfo[1]) concerns the current INSPIRE Resource;
6. INSPIRE only considers the instance of MD_Metadata.dataQualityInfo applicable to the whole resource;
7. There shall not be more than one instance of MD_Metadata.identificationInfo[1] .MD_Identification.citation.CI_Citation.date declared as a creation date (i.e. CI_Date.dateType having the creation value);
8. MD_Metadata.identificationInfo[1].MD_DataIdentification.citation .CI_Citation.identifier is mandatory for metadata sets related to spatial dataset and spatial dataset series;
9. The data type of MD_Metadata.identificationInfo.MD_DataIdentification.language is the codelist LanguageCode from ISO/TS 19139;
10. There is at least one instance of MD_Metadata.identificationInfo[1].MD_DataIdentification.extent defining the geographic location of the resource as a geographic bounding box (i.e. an instance of EX_GeographicBoundingBox or one of its subclasses).
11. There shall be at least one instance of MD_Metadata.identificationInfo[1] .MD_Identification.resourceConstraints

[1] MD_Metadata is the root class of ISO 19115 objects. In the case of ISO 19115-2 the root element is MI_Metadata.

12. The coordinates of the bounding boxes (instance of EX_GeographicBoundingBox) shall be expressed in any geodetic coordinate reference system with the Greenwich Prime Meridian

13. MD_Metadata.identificationInfo[1].MD_DataIdentification.pointOfContact[1] .CI_ResponsibleParty.organisationName and MD_Metadata.identificationInfo[1] .MD_DataIdentification.pointOfContact[1] .CI_ResponsibleParty.contactInfo.CI_Contact.address.CI_Address.electronicMailAddress are mandatory.

14. MD_Metadata.contact[1].CI_ResponsibleParty.organisationName and MD_Metadata.contact[1]. CI_ResponsibleParty.contactInfo.CI_Contact.address.CI_Address.electronicMailAddress are mandatory.

15. The value of MD_Metadata.contact[1].CI_ResponsibleParty.role.CI_RoleCode shall be pointOfContact.

16. At least one keyword of GEMET thesaurus [2] shall be documented using MD_Metadata.identificationInfo[1] .MD_DataIdentification.descriptiveKeywords.

4.4 ISO 19139 XML Schema implementation for metadata

The ISO 19115(-2) model described in one of the previous sections is a conceptual model that does not provide any encoding for implementing the geographic information. The ISO 19139(-2) Technical Specification [12], [16] however, provides the XML implementation schema for ISO 19115 specifying the metadata record format. This de facto standard may be used to describe, validate, and exchange geospatial metadata prepared in XML.

In the ISO 19139 XML Schema, much attention is paid to the types of the XML elements described in the schema. All elements in the schema are of a known type and together they form the XML objects that build up the metadata record. These objects directly relate to the ISO 19115 metadata objects.

4.5 Earth observation collection discovery

The document OGC 11-035r1 [17] presents an analysis of the minimal set of metadata required for a meaningful and concise description of EO product collections. It also describes the relations between several metadata conceptual models. Although the document is an OGC Best Practice document rather than a standard, it provides a very useful recommendation on applying the ISO and INSPIRE standards to collections of Earth observation products. An EO product collection is equivalent to a dataset series as defined within ISO 19115. It is a collection of datasets sharing the same product specification. An EO product collection typically corresponds to datasets (i.e. products) derived from data acquired by a single or set of sensors on-board a satellite and having the same operation mode.

OGC 11-035r1 lists the minimal set of ISO 19115-2 metadata elements comprising instances of the root class and the following major classes (see also Figure 1):

- MI_Metadata
- MD_DataIdentification
- DQ_DataQuality
- MD_ContentInformation (optional)
- MI_AcquisitionInformation

The document provides a detailed overview of the mandatory (from the EO product collection perspective) metadata elements and relates these elements to the INSPIRE metadata elements.

4.6 Earth observation metadata profile of observations & measurements

As has been described in the previous section, ISO distinguishes dataset series and individual datasets, which in the context of Earth observation is translated to collections and products. Whereas the EO collections can be described with metadata based on the ISO 19115-2/ISO 19139-2 model, the product specific metadata need another model. To this end the EO metadata profile of observations and measurements [4] was developed in

[2] see: `http://www.eionet.europa.eu/gemet/inspire_themes?langcode=en`

the context of the Heterogeneous Mission Accessibility (HMA) project initiated by European Space Agency (ESA) and submitted to the OGC.

Based on the OGC 10-025 standard for Observations & Measurements [13], an Earth Observation Product (EOP) schema was developed which refines an observation [3] into the feature type *earth observation*. This schema was then extended with sensor-specific thematic schemata as illustrated in Table 2.

Schema name	Describes characteristics of
opt.xsd	High-resolution optical products
sar.xsd	Products created with SAR sensors
atm.xsd	Products created with atmospheric sensors
alt.xsd	Products created with altimetry sensors
lmb.xsd	Products created with limb-looking sensors
ssp.xsd	Synthesis and systematic products

Table 2: XML schemata for EO products. The associated XML namespaces for these thematic products are: *opt*, *sar*, *atm*, *alt*, *lmb* and *ssp*, respectively.

The root class of the EOP schema (with XML namespace eop) is: eop:EarthObservation, which contains the following classes:

- eop:EarthObservationEquipment
- eop:Footprint
- eop:EarthObservationResult
- eop:EarthObservationMetadata.

The complete description of the eop:EarthObservation element and child elements, including the OMI profiling, is given in Section 5.3.

4.7 CF-metadata conventions

The CF-Metadata Conventions [6] recommend to include global attributes in the NetCDF file, providing information about the contents of the data file and the origin of the data. Although the attributes are recommended, none of them are actually mandatory. The CF-Metadata Conventions suggest the following attributes (either global or as variable attribute)(see Table 3):

Attribute	Description
Conventions*	Specifies the names of the conventions followed by the dataset
title*	A succinct description of what is in the dataset
history*	A list of programs that have modified the data (preferably providing: date, time of day, user name, program name and command arguments).
institution	Specifies where the original data was produced
source	The method of production of the original data. If it was model-generated, source should name the model and its version, as specifically as could be useful. If it is observational, source should characterize it (e.g., "surface observation" or "radiosonde").
references	Published or web-based references that describe the data or methods used to produce it
comment	Miscellaneous information about the data or methods used to produce it.

Table 3: Main metadata attributes suggested by CF-Metadata conventions. Indicated with a "*": global attributes recommended by the NetCDF User Guide (NUG).

[3] An observation is an event that estimates an observed property of some feature of interest using a specified procedure and generates a result.

4.8 NetCDF attribute convention for dataset discovery

The wiki pages [18] of the Federation of Earth Science Information Partners (ESIP) provide information on Attribute Conventions for Dataset Discovery. These conventions identify and define a list of NetCDF global attributes recommended for describing a NetCDF dataset to discovery systems such as Digital Libraries.

Although some of the attributes are recommended or highly recommended, none of them are actually mandatory. Only the highly recommended attributes are presented here, because more detailed information is provided by the ISO metadata information. Although also these highly recommended attributes overlap with ISO metadata, they are useful because they provide easy to extract human readable information, using many available software tools.

In the current version (Version 2.0 beta) of NetCDF Attribute Convention for Dataset Discovery the following global attributes are highly recommended (see Table 4):

Attribute	**Description**
title	The "title" attribute gives a brief description of the dataset. The "title" attribute is recommended by the NetCDF Users Guide (NUG) and the CF-Metadata convention
summary	The "summary" attribute gives a longer description of the dataset. In many discovery systems, the title and the summary will be displayed in the results list from a search. It should therefore capture the essence of the dataset it describes
keywords	The "keywords" attribute lists key words and phrases that are relevant to the dataset. The values in the list may be taken from a controlled list of keywords
Metadata_Link*	The value of this attribute is a URL that gives the location of the more complete metadata

Table 4: Highly recommended attributes by ACDD. Indicated with a “*“: recommended attributes but not part of the current version.

5 OMI L1b product metadata profile

5.1 Rationale

The previous sections provide a comprehensive overview of the various standards related to geo-information and Earth observation metadata models and their implementation. The use of these standards not only facilitates the discovery of data products but also enables information sharing about, amongst others, the content, the processing history and the proper use of the product. Many metadata elements are available for producing extensive and detailed descriptions of data products. However, in practice only a limited set of metadata elements will be sufficient to fulfill a minimal set of requirements with respect to the product description.

In the following sections the profiling of the metadata standards (i.e. ISO Metadata profile, EO metadata profile, ECS metadata profile and the CF/NetCDF metadata profile) for OMI will be presented.

The approach for the OMI L1b products is to include all the required metadata information into the product allowing the automated extraction of XML formatted metadata records that are fully conformant to the INSPIRE standard [9] and the OGC standard [4]. This means that the metadata are integrated into the product independent of a metadata implementation and that tools are required to produce the standardized metadata representations.

5.2 ISO Metadata profile for OMI

The tables in the following sections list the metadata information that will be provided in the L1b product. The definitions are taken from references [1] and [2]. Where relevant, also fixed values and/or example values are provided.

Only the metadata classes and the members within these classes are listed that are minimally required to create metadata conforming the INSPIRE standards. Sometimes, the description of classes (typically, CI_Date, CI_Citation) is only repeated when some information on the used values is present.

For the XML elements representing these classes tables are provided which describe the various fields (child elements); for each field the table provides the description (including OMI specific comments in blue), the cardinality (as defined by ISO) and the OMI tailoring (in blue). The fields that are printed in italics (shaded rows) are child elements representing subclasses of the model; when relevant these subclasses are described in subsequent sections, in which case it is indicated in the table. The XML elements are provided including the namespace prefix, where *gmi= http://www.isotc211.org/2005/gmi* , *gmd= http://www.isotc211.org/2005/gmd* , *gco= http://www.isotc211.org/2005/gco* and *gml= http://www.opengis.net/gml/3.2* . Typically, the *"gmd:"* prefix is used for the standard ISO fields and the *"gmi:"* prefix is used for fields of the ISO extensions.

5.2.1 XML Type: gmi:MI_Metadata

The (mandatory) root class MI_Metadata contains information about the metadata itself and also acts as a container for the other metadata classes. There are two required elements: a contact and a date. The contact is the organization or person responsible for the metadata. The date is the date that the metadata were created. Note that the MD_Metadata object was extended in Part 2 of the ISO Metadata Standard (19115-2) to include the MI_AcquisitionInformation class for describing platforms, instruments, and other aspects of data acquisition. This extension requires changing the name MD_Metadata to MI_Metadata. For the L1b products the full standard (including Part 2) is used.

gmi:MI_Metadata			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
gmd:fileIdentifier	unique identifier for metadata file In case the metadata describes a collection of products (i.e. series), the fileIdentifier is equal to the identifier of the EO Product Collection (i.e. eop:parentIdentifier in Table 44. This allows for relating individual products (described by EOP metadata) to EO Collections (described by ISO metadata). For a discussion on the format of the fileIdentifier see the text below this table).	0...1	Yes Used with cardinality 1 example (dataset): "OMI-Aura_L1-OML1BRVG_-2011m0720t0213-o037292_v0401-2021m0303t1441.xml"
gmd:language	language used for metadata	0...1	Yes fixed: "eng"
gmd:characterSet	character coding of metadata	0...1	Yes fixed: "utf8"
gmd:hierarchyLevel	scope to which metadata applies	0...n	Yes "dataset" or "series"
gmd:hierarchyLevelName	name of the hierarchy levels for which the metadata is provided	0...n	Yes (if "series") fixed: "EO Product Collection"
gmd:contact/ gmd:CI_ResponsibleParty	*party responsible for the metadata information*	*1...n*	Yes See below
*gmd:dateStamp/ gco:Date**	*date that the metadata was created*	*1*	
gmd:metadataStandardName	name of the metadata standard *fixed: ISO 19115-2 Geographic Information - Metadata Part 2 Extensions for imagery and gridded data"*	0...1	Yes Used with cardinality 1
gmd:metadataStandardVersion	version (profile) of the metadata standard used *fixed: "ISO 19115-2:2009(E), OMI profile"*	0...1	Yes Used with cardinality 1
gmd:identificationInfo/ gmd:MD_DataIdentification	*basic information about the resource(s) to which the metadata applies*	*1...n*	Yes Used with cardinality 1 See section below on gmd:MD_DataIdentification
gmd:dataQualityInfo/ gmd:DQ_DataQuality	*provides overall assessment of quality of a resource(s)*	*0...n*	Yes Used with cardinality 1 See section below on gmd:DQ_DataQuality
gmi:acquisitionInformation/ gmi:MI_AcquisitionInformation	*provides information about the acquisition of the data*	*0...n*	Yes Used with cardinality 1 See section below on gmi:MI_AcquisitionInformation

Table 5: MI_Metadata class. *) Date: gives values for year, month and day. Character encoding of a date is a string which shall follow the format for date specified by ISO 8601. This class is documented in full in ISO/TS 19103 (see: [1] Section B.4).

On the use of gmd:fileIdentifier As already mentioned in Table 5 the use of the same identifier for the gmd:fileIdentifier (ISO metadata) and eop:parent-Identifier (EOP metadata) allows linking of individual products to a collection of EO products. In [19] the following approach with respect to the naming convention is described for the eop:parentIdentifier. This approach is suggested here for the eop:parentIdentifier and gmd:fileIdentifer in case the metadata describe a collection. From [19]:

> "Often EO collections are organized per satellite, instrument or even submode of the instrument. The convention for the parentIdentifier is as defined in *"Definition identifier URNs in OGC namespace"* [20] i.e. urn:ogc:def:objectType:authority:version:code. where the registered namespace authority is ogc, the objectType is EOP (it cannot be thematic or mission specific acronyms like OPT, ATM, PHR,etc), the authority representing the Ground Segment i.e NASA, ESA, SPOT, EUM etc. The version is optional. The code is a unique identifier specified by the authority which corresponds here to the collection name. The ":" will delimit the start of the collection name. The collection name can be defined as required by the Ground Segment but to ensure unique names the following representation is proposed: programme.satellite_instrument_processing."

An example of the fileIdentifier for the case of OMI:
urn:ogc:def:EOP:NASA:AURA.OMI.OML1BRVG.

gmd:CI_ResponsibleParty			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
gmd:individualName	name of the responsible person Not used for OMI L1b products	0...1	
gmd:organisationName	name of the responsible organization	0...1	Yes fixed: "GES DISC HELP DESK SUPPORT GROUP"
gmd:positionName	role or position of the responsible person Not used for OMI L1b products	0...1	
gmd:contactInfo/ gmd:CI_Contact	*address of the responsible party*	*0...1*	Yes See below
gmd:role	function performed by the responsible party	1	Yes fixed: "pointOfContact"

Table 6: MI_Metadata.contact. Multiple occurrences of *contact* are allowed.

gmd:CI_Contact			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
gmd:address/ gmd:CI_Address	*physical and email address at which the organization or individual may be contacted*	*0. . . 1*	Yes See below

Table 7: MI_Metadata.contact.contactInfo

gmd:CI_Address			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
gmd:electronicMailAddress	address of the electronic mailbox of the responsible organization or individual	0. . . 1	Yes fixed: "gsfc-dl-help-disc@mail.nasa.gov"

Table 8: MI_Metadata.contact.contactInfo.address

5.2.2 XML Type: gmd:MD_DataIdentification

Identification information contains information to uniquely identify the data. Identification information includes information about the citation for the resource, an abstract, the purpose, credit, the status and points of contact. The MD_Identification entity is mandatory. The MD_Identification entity is specified (subclassed) as MD_DataIdentification because in this case it used to identify data.

gmd:MD_DataIdentification			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
gmd:citation/ gmd:CI_Citation	citation data for the resource(s)	1	Yes See below
gmd:status	status of the resource(s) Not used for OMI L1b products	0. . . n	
gmd:pointOfContact/ gmd:CI_ResponsibleParty	*identification of, and means of communication with, person(s) and organization(s) associated with the resource(s)*	*0. . . n*	Yes Used with cardinality 1 See below
gmd:descriptiveKeywords/ gmd:MD_Keywords	*provides category keywords, their type, and reference source*	*0. . . n*	Yes Used with cardinality 1 See below
gmd:resourceConstraints/ gmd:MD_Constraints	*provides information about constraints which apply to the resource(s)*	*0. . . n*	Yes Used with cardinality 1 See below
gmd:spatialRepresentationType gmd:MD_SpatialRepresentationCode	method used to spatially represent geographic information.	0. . . n	Yes fixed: "grid"
gmd:spatialResolution/ gmd:MD_Resolution	*factor which provides a general understanding of the density of spatial data in the dataset* Not used for OMI L1b products	*0. . . n*	
gmd:language	language(s) used within the dataset	1. . . n	Yes fixed: "eng"
gmd:characterSet	full name of the character coding standard used for the dataset	0. . . n	Yes fixed: "utf8"
gmd:topicCategory	main theme(s) of the dataset	0. . . n	Yes fixed: "climatologyMeteorologyAtmosphere"

gmd:MD_DataIdentification *(cont'd)*			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
gmd:extent/ gmd:EX_Extent	*extent information including the bounding box, bounding polygon, vertical, and temporal extent of the dataset*	*0...n*	Yes See below
gmd:abstract	brief narrative summary of the content of the resource(s)	1	fixed: "The Ozone Monitoring Instrument (OMI) flies on NASA's Aura satellite, (launched on 15 July 2004) in a low Earth orbit that provides daily global information on concentrations of trace gases and aerosols important for air quality, climate forcing, and the ozone layer. The payload of the mission consists of four instruments, which are the High Resolution Dynamics Limb Sounder (HIRDLS), the Microwave Limb Sounder (MLS), the Tropospheric Emission Spectrometer (TES), which is a nadir and limb sounder, and the Ozone Monitoring Instrument (OMI). OMI is jointly developed by The Netherlands and Finland. The instrument consists of a spectrometer with spectral bands in the ultraviolet and visible. The selected wavelength range for OMI allows observation of key atmospheric constituents, including ozone (O3), nitrogen dioxide (NO2), sulfur dioxide (SO2), formaldehyde (CH2O), aerosols and clouds."

Table 9: MI_Metadata.identificationInfo

gmd:CI_Citation			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
gmd:title	name by which the cited resource is known	1	Yes example: "OMI/Aura Level 1B VIS Global Geolocated Earthshine Radiances"
gmi;date/ gmd:CI_Date	*reference date for the cited resource*	*1...n*	Yes See below
gmd:identifier/ gmd:MD_Identifier	*value uniquely identifying an object within a namespace*	*0...n*	Yes See below

Table 10: MI_Metadata.identificationInfo.citation

gmd:CI_Date			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
gmd:date	reference date for the cited resource	1	
gmd:dateType	event used for reference date	1	Yes "creation" for files, "publication" for standards or documents

Table 11: MI_Metadata.identificationInfo.citation.date

gmd:MD_Identifier			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
gmd:authority/ gmd:CI_Citation	*person or party responsible for maintenance of the namespace* Not used for OMI L1b products	*0...1*	
gmd:code	alphanumeric value identifying an instance in the namespace	1	Yes example (dataset): "OMI-Aura_L1-OML1BRVG_-2011m0720t0213-o037292_v0401-2021m0303t1441"

Table 12: MI_Metadata.identificationInfo.citation.identifier

gmd:CI_ResponsibleParty			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
gmd:individualName	name of the responsible person Not used for OMI L1b products	0...1	
gmd:organisationName	name of the responsible organization	0...1	Yes fixed: "GES DISC HELP DESK SUPPORT GROUP"
gmd:positionName	role or position of the responsible person Not used for OMI L1b products	0...1	Yes

gmd:CI_ResponsibleParty *(cont'd)*			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
gmd:contactInfo/ gmd:CI_Contact	*address of the responsible party*	*0...1*	Yes See below
gmd:role	function performed by the responsible party	1	Yes fixed: "distributor"

Table 13: MI_Metadata.identificationInfo.pointOfContact

gmd:CI_Contact			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
gmd:address/ gmd:CI_Address	*physical and email address at which the organization or individual may be contacted*	*0...1*	Yes Used with cardinality 1 See below

Table 14: MI_Metadata.identificationInfo.pointOfContact.contactInfo

gmd:CI_Address			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
gmd:electronicMailAddress	address of the electronic mailbox of the responsible organization or individual	0...1	Yes fixed: "gsfc-dl-help-disc@mail.nasa.gov"

Table 15: MI_Metadata.identificationInfo.pointOfContact.contactInfo.address

gmd:MD_Keywords			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
gmd:keyword	commonly used word(s) or formalized word(s) or phrase(s) used to describe the subject	1...n	Yes fixed: "Atmospheric conditions"
gmd:type	subject matter used to group similar keywords	0...1	Yes fixed: "theme"
gmd:thesaurusName/ gmd:CI_Citation	*name of the formally registered thesaurus or a similar authoritative source of keywords*	*0...1*	Yes See below

Table 16: MI_Metadata.identificationInfo.descriptiveKeywords. Presented here is the descriptive keyword expressing the INSPIRE Data Theme which is required by INSPIRE. Multiple occurrences of this element specifying other keywords are allowed.

gmd:CI_Citation			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
gmd:title	name by which the cited resource is known	1	Yes fixed: "GEMET - INSPIRE themes version 1.0"

gmd:CI_Citation *(cont'd)*			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
gmd:date/ gmd:CI_Date	*reference date for the cited resource*	*1...n*	Yes fixed: date="2008-06-01"; dateType="publication"

Table 17: MI_Metadata.identificationInfo.descriptiveKeywords.thesaurusName. Presented here is the thesaurusName to be used in combination with the keyword specifying the INSPIRE Data Theme.

gmd:MD_LegalConstraints			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
gmd:useLimitation	limitation affecting the fitness for use of the resource or metadata	0...n	Yes Used with cardinality 1 fixed: "no conditions apply"
gmd:accessConstraints/ gmd:MD_RestrictionCode	access constraints applied to assure the protection of privacy or intellectual property, and any special restrictions or limitations on obtaining the resource or metadata.	0...n	Yes fixed: "copyright"
gmd:otherConstraints/ gco:CharacterString	other restrictions and legal prerequisites for accessing and using the resource or metadata	0...n	Yes fixed: "no limitations"
gmd:classification	name of the handling restrictions on the resource or metadata	0...n	Yes fixed: "unclassified"

Table 18: MI_Metadata.identificationInfo.resourceConstraints. The presented example is in line with the INSPIRE guidelines [9]: "There shall be at least one instance of MD_Constraints or one of its subclasses (here: MD_LegalConstraints) even if there is no limitation on public access or no specific condition applies to access and use of the resource. When a single instance is provided in a given metadata set, it shall handle metadata elements representing both at least one condition applying to access and use (here: accessConstraints) and at least one limitation on public access (here: useLimitation)."

gmd:EX_Extent			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
gmd:geographicElement/ gmd:EX_GeographicBoundingBox	*geographic position of the dataset. Note: this is only an approximate reference so specifying the coordinate reference system is unnecessary*	*0...n*	Yes Used with cardinality 1 (series) See below
gmd:geographicElement/ gmd:EX_BoundingPolygon	boundary enclosing the dataset, expressed as the closed set of (x,y) coordinates of the polygon (last point replicates first point) Not used for OMI L1b products		
gmd:temporalElement/ gmd:EX_TemporalExtent	*time period covered by the content of the dataset*	0...n	Yes Used with cardinality 1 See below

Table 19: MI_Metadata.identificationInfo.extent. In addition to the commonly used geographic bounding box, also a polygon is provided. This polygon provides a better representation of the coverage of the OMI L1b product.

gmd:EX_GeographicBoundingBox			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
gmd:extentTypeCode	indication of whether the bounding polygon encompasses an area covered by the data or an area where data is not present	0...1	Yes fixed: "true"; where true=inclusion, false=exclusion
gmd:westBoundLongitude	western-most coordinate of the limit of the dataset extent, expressed in longitude in decimal degrees (positive east) (*-180. <= value <= 180.*)	1	
gmd:eastBoundLongitude	eastern-most coordinate of the limit of the dataset extent, expressed in longitude in decimal degrees (positive east) (*-180. <= value <= 180.*)	1	
gmd:southBoundLatitude	southern-most coordinate of the limit of the dataset extent, expressed in latitude in decimal degrees (positive north) (*-90. <= value <= 90.*)	1	
gmd:northBoundLatitude	northern-most, coordinate of the limit of the dataset extent expressed in latitude in decimal degrees (positive north) (*-90. <= value <= 90.*)	1	

Table 20: MI_Metadata.identificationInfo.geographicElement (bbox)

gmd:EX_TemporalExtent			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
gmd:extent/ TM_Primitive*	time period covered by the content of the dataset (*gml:TimePeriod: gml:beginPosition, gml:endPosition*)	1	

Table 21: MI_Metadata.identificationInfo.temporalElement. *)TM_Primitive: an abstract class representing a non-decomposed element of geometry or topology. This class is fully documented in ISO 19108 (see: [1] Section B.4).

5.2.3 XML Type: gmd:DQ_DataQuality

This package contains a general assessment of the quality of the dataset. In addition, the package contains information about the sources and production processes used in producing a dataset, which is of particular importance for imagery and gridded data. For the OMI L1b products the use of the contained class LI_Lineage is important for describing the sources which are either used or produced (output) in a series of process steps. The sources refer to the various L0 data products used as inputs when producing the L1b products.

gmd:DQ_DataQuality			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
gmd:scope/ gmd:DQ_Scope	*the specific data to which the data quality information applies*)	*1*	Yes See below
gmd:report/ gmd:DQ_Element	*quantitative quality information for the data specified by the scope*	*0...n*	Yes Used with cardinality 1 See below
gmd:lineage/ gmd:LI_Lineage	*non-quantitative quality information about the lineage of the data specified by the scope*	*0...1*	Yes Used with cardinality 1 See below

Table 22: MI_Metadata.dataQualityInfo

gmd:DQ_Scope			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
gmd:level	hierarchical level of the data specified by the scope.	1	Yes fixed: "dataset"
gmd:extent	information about the horizontal, vertical and temporal extent of the data specified by the scope Not used for OMI L1b products	0...1	

Table 23: MI_Metadata.dataQualityInfo.scope

gmd:DQ_DomainConsistency			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
gmd:result/ gmd:DQ_Result	*value (or set of values) obtained from applying a data quality measure or the outcome of evaluating the obtained value (or set of values) against a specified acceptable conformance quality level*	*1...2*	Yes See below

Table 24: MI_Metadata.dataQualityInfo.report. DQ_DomainConsistency implements the abstract class DQ_-Element; INSPIRE requires that the metadata includes information on the degree of conformity with the implementing rules [9]. When the conformity to an INSPIRE Specification has been evaluated, it shall be reported as a domain consistency element (i.e. an instance of DQ_DomainConsistency) in ISO 19115 metadata. In that case, if the evaluation has passed, the metadata is conformant, otherwise it is not conformant.

gmd:DQ_ConformanceResult			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
gmd:specification/ gmd:CI_Citation	*citation of product specification or user requirement against which data is being evaluated*	*1*	Yes See below
gmd:explanation	explanation of the meaning of conformance for this result	1	
gmd:pass	indication of the conformance result where 0 = fail and 1 = pass	1	

Table 25: MI_Metadata.dataQualityInfo.report.result implements the abstract class DQ_Result; Known relevant specifications include the INSPIRE Data Specification guidelines established for each INSPIRE theme. The Specification element should be given as follows: title: "INSPIRE Data Specification on <Theme Name> –Guidelines" date: dateType: publication (see also Table 24).

gmd:CI_Citation			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
gmd:title	name by which the cited resource is known	1	Yes fixed: "INSPIRE Data Specification on Atmospheric Conditions and Meteorological Geographical Features – Technical Guidelines, version 3.0"

gmd:CI_Citation *(cont'd)*			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
gmd:date/ gmd:CI_Date	*reference date for the cited resource*	*1...n*	Yes fixed: date="2013-02-04"; dateType="publication"

Table 26: MI_Metadata.dataQualityInfo.report.result.specification. See also Table 24 and Table 25.

gmd:LI_Lineage			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
gmd:statement	general explanation of the data producer's knowledge about the lineage of a dataset	0...1	Yes Used with cardinality 1
gmd:processStep/ gmi:LE_ProcessStep	*information about an event or transformation in the life of the dataset including details of the algorithm and software used for processing*	*0...1*	Yes See below

Table 27: MI_Metadata.dataQualityInfo.lineage

gmi:LE_ProcessStep			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
gmd:description	description of the event, including related parameters or tolerances	1	
gmd:source/ gmi:LE_Source	*information about the source data used in creating the data specified by the scope*	*0...n*	Yes Used with cardinality n See below
gmi:output/ gmi:LE_Source	*description of the product generated as a result of the process step*	*0...n*	Yes See below
gmi:processingInformation/ gmi:LE_Processing	*comprehensive information about the procedure by which the algorithm was applied to derive geographic data from the raw instrument measurements, such as datasets, software used, and the processing environment*	*0...1*	Yes See below
gmi:report/ gmi:LE_ProcessStepReport	*report of what occurred during the process step*	*0...n*	Yes See below

Table 28: MI_Metadata.dataQualityInfo.lineage.processStep. Typically, there will be multiple occurrences of the gmd:source member, namely one for each input product (see [7] for an overview of the input products).

gmi:LE_Source			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
gmd:description	information on data sets input to or output by the processing step	0...1	
gmi:processedLevel	processing level of the data	0...1	Yes example: "L0" or "L1b"

gmi:LE_Source *(cont'd)*			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
gmd:sourceCitation/ gmd:CI_Citation	*recommended reference to be used for the source data* Not used for OMI L1b products	*0...1*	
gmd:sourceStep/ gmi:LE_ProcessStep	*information about an event or transformation in the life of the dataset including details of the algorithm and software used for processing* Not used for OMI L1b products	*0...n*	

Table 29: MI_Metadata.dataQualityInfo.lineage.processStep.source(output). The LE_Source class is used to describe both input datasets as output products (see Table 28) of the L01b processing.

gmd:CI_Citation			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
gmd:title	name by which the cited resource is known	1	Yes example: "Aura/OMI L0 instrument data for the UV detector"
gmd:alternateTitle	short name or other language name by which the cited information is known	0...n	Yes
gmd:date/ gmd:CI_Date	*reference date for the cited resource*	*0...n*	Yes example: date="2014-08-27"; dateType="creation"

Table 30: MI_Metadata.dataQualityInfo.lineage.processStep.source.citation. The gmd:alternateTitle is used to specify individual input products of a set of input products. The set itself is specified in the gmd:title

gmi:LE_Processing			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
gmi:identifier/ gmd:MD_Identifier	*information to identify the processing package that produced the data*	*1*	Yes fixed: "KNMI OMI L01b processor"
gmi:softwareReference/ gmd:CI_Citation	*reference to document describing processing software*	*0...n*	Yes fixed: "OMI L01b processor"
gmi:procedureDescription	additional details about the processing procedures Not used for OMI L1b products	0...1	

gmi:LE_Processing *(cont'd)*			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
gmi:documentation/ gmd:CI_Citation	*reference to documentation describing the processing*	*0...n*	Yes Used with cardinality n The gmd:date value of the document citations is intentionally not set. This to indicate the last version of the document should be referenced. example: "AURA-OMI-KNMI-L01B-0002-SD-algorithm_theoretical_-basis_document"
gmi:runTimeParameters	parameters to control the processing operations, entered at run time Not used for OMI L1b products	0...1	
gmi:algorithm/ gmi:LE_Algorithm	*details of the methodology by which geographic information was derived from the instrument readings* Not used for OMI L1b products	*0...n*	

Table 31: MI_Metadata.dataQualityInfo.lineage.processStep.processingInformation. Multiple occurrences of documentation are used here to refer to the algorithm theoretical basis document [8] and the input/output data specification document [7].

gmi:LE_ProcessStepReport			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
gmi:name	name of the processing report	1	Yes fixed: "OMI L01b processing report"
gmi:description	textual description of what occurred during the process step	0...1	fixed: "L0 processed to L1b data using the KNMI OMI L01b processor"
gmi:fileType	type of file that contains the processing report	0...1	Yes fixed: "NetCDF-4"

Table 32: MI_Metadata.dataQualityInfo.lineage.processStep.report

5.2.4 XML Type: gmi:MI_AcquisitionInformation

The MI_AcquisitionInformation class was added in the ISO 19115-2 extension in order to provide details specific to the acquisition of imagery and gridded data. In particular, subclasses like MI_Platform and MI_Instrument provide information about the platform from which the data were collected and about the measuring devices that were used.

gmi:MI_AcquisitionInformation			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
gmi:instrument/ gmi:MI_Instrument	*general information about the instrument used in data acquisition* Not used for OMI L1b products	*0...n*	

gmi:MI_AcquisitionInformation *(cont'd)*			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
gmi:platform/ gmi:MI_Platform	*general information about the platform from which the data were taken*	*0...n*	Yes See below

Table 33: MI_Metadata.acquisitionInformation

gmi:MI_Platform			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
gmi:citation/ gmd:CI_Citation	*complete citation of the instrument*	*0...1*	
gmi:identifier/ gmd:RS_Identifier	*unique identification of the instrument*	*1*	Yes See below
gmi:description	narrative description of the platform supporting the instrument	1	Yes fixed: "NASA EOS-Aura"
gmi:sponsor/ gmd:CI_ResponsibleParty	*organization responsible for building, launch, or operation of the platform* Not used for OMI L1b products	*0...n*	
gmi:instrument/ gmi:MI_Instrument	*general information about the instrument used in data acquisition*	*1...n*	Yes See below

Table 34: MI_Metadata.acquisitionInformation.platform

gmd:RS_Identifier			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
gmd:authority/ gmd:CI_Citation	*person or party responsible for maintenance of the namespace* Not used for OMI L1b products	*0...1*	
gmd:code	alphanumeric value identifying an instance in the namespace	1	Yes fixed: "Aura"
gmd:codeSpace	name or identifier of the person or organization responsible for namespace	0...1	Yes fixed: " http://www.nasa.gov/ "
gmd:version	version identifier for the namespace	0...1	

Table 35: MI_Metadata.acquisitionInformation.platform.identifier. Note: The RS_Identifier extends the MD_-Identifier by adding a codeSpace and a version for the namespace. These additions address the lack of an agreed upon approach for describing a namespace using the gmd:authority/gmd:CI_Citation alone.

gmi:MI_Instrument			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
gmi:citation/ gmd:CI_Citation	*source where information about the platform is described* Not used for OMI L1b products	*0...1*	
gmi:identifier/ gmd:RS_Identifier	*unique identification of the instrument*	*1*	Yes fixed: code="OMI", codeSpace= " http://www.nasa.gov/ "
gmi:type	name of the type of instrument	1	Yes

gmi:MI_Instrument *(cont'd)*			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
gmi:description	textual description of the instrument	0...1	

Table 36: MI_Metadata.acquisitionInformation.platform.instrument

5.3 Earth observation metadata profile for OMI

The following sections provide a comprehensive overview of the classes of the EarthObservation model and how they are customized for the OMI L1b products. For the XML elements representing these classes tables are provided which describe the various fields (child elements); for each field the table provides the description (including OMI specific comments in blue), the cardinality (as defined by the EOP model) and the OMI tailoring (in blue). The fields that are printed in italics (shaded rows) are child elements representing subclasses of the model; when relevant these subclasses are described in subsequent sections, in which case it is indicated in the table. The XML elements are provided including the namespace prefix, where *eop= http://www.opengis.net/eop/2.1* and *gml= http://www.opengis.net/gml/3.2* .

5.3.1 XML Type: eop:EarthObservation

The eop:EarthObservation element is the root of every Earth observation product and a description is given in Table 37; the fields also show also the corresponding XML elements from the OGC Observations & Measurements model.

eop:EarthObservation			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
gml:id attribute	Mandatory identifier required by GML. Its value must be unique among all the gml:id attributes of the XML file. The convention to use the product identifier plus a suffix in order to have the gml:id unique inside the document.	1	Yes Value: eop:identifier + '.EO' as suffix.
om:phenomenonTime/ gml:TimePeriod/ gml:beginPosition	Acquisition start date time; dateTime in ISO 8601 format (CCYY-MM-DDThh:mm[:ss[.cc]])	1	
om:phenomenonTime/ gml:TimePeriod/ gml:endPosition	Acquisition end date time; dateTime in ISO 8601 format (CCYY-MM-DDThh:mm[:ss[.cc]])	1	
om:resultTime/ gml:TimeInstant/ gml:timePosition	The time when the result becomes available; dateTime in ISO 8601 format (CCYY-MM-DDThh:mm[:ss[.cc]]Z) Not used for OMI L1b products	1	
om:procedure/ eop:EarthObservationEquipment	*Platform/Instrument/Sensor used for the acquisition and the acquisition parameters*	*1*	Yes See section below on eop:Earth Observation Equipment
om:observedProperty	An xlink to the observed property definition This element should use the attribute nilReason="inapplicable"	1...n	Yes Used with cardinality 1
om:featureOfInterest/ eop:Footprint	*Observed area on the ground or its projection i.e. the footprint of acquisition* Only for OMI L1b radiance products	*0...n*	Yes See section below on eop:Footprint

eop:EarthObservation *(cont'd)*			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
om:result/ eop:EarthObservationResult	*Earth observation result metadata composed of the browse, mask and product description* Not used for OMI L1b products	*0...n*	
eop:metaDataProperty/ eop:EarthObservationMetaData	*Additional external metadata about the data acquisition*	*1*	Yes See section below on eop:EarthObservationMetaData

Table 37: <eop:EarthObservation> fields description

5.3.2 XML Type: eop:EarthObservationEquipment

The eop:EarthObservationEquipment element contains metadata relative to the mechanism used during the EarthObservation. These metadata describe on one hand the platform, instrument and sensor used for the EarthObservation and on the other hand, the acquisition parameters of this observation. The complete description of the eop:EarthObservationEquipment is given in Table 38.

eop:EarthObservationEquipment			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
gml:id attribute	Mandatory identifier required by GML. Its value must be unique among all the gml:id attributes of the XML file. The convention to use the product identifier plus a suffix in order to have the gml:id unique inside the document.	1	Yes Value: eop:identifier + '.EOE' as suffix.
eop:platform/ eop:Platform	*Platform information*	*1*	Yes See section below on eop:Platform
eop:instrument/ eop:Instrument	*Instrument information*	*0...1*	Yes See section below on eop:Instrument
eop:sensor/ eop:Sensor	*Sensor information*	*0...1*	Yes See section below on eop:Sensor
eop:acquisitionParameters/ eop:Acquisition	*Acquisition parameters*	*0...1*	Yes See section below on eop:Acquisition

Table 38: <eop:EarthObservationEquipment> fields description

5.3.3 XML Type: eop:Platform

The eop:Platform element contains metadata relative to the mechanism used during the EarthObservation, in particular the metadata describing the platform used for the EarthObservation. The complete description of the eop:Platform is given in Table 39.

eop:Platform			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
eop:shortName	Platform short name (e.g. Aura)	1	Yes Fixed value: "Aura"
eop:serialIdentifier	Platform serial identifier Aura has no serial identifier	0...1	
eop:orbitType	High level characterization of main mission types taken from a codelist Values: GEO, LEO Not used for OMI L1b products	0...1	

Table 39: <eop:Platform> fields description

5.3.4 XML Type: eop:Instrument

The eop:Instrument element contains metadata relative to the mechanism used during the EarthObservation, in particular the metadata describing the instrument used for the EarthObservation. The complete description of the eop:Instrument is given in Table 40.

eop:Instrument			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
eop:shortName	Instrument (Sensor) name	0...1	Yes Used with cardinality 1 Fixed value: "OMI"
eop:description	Instrument description Not used for OMI L1b products	0...1	
eop:instrumentType	Instrument type Not used for OMI L1b products	0...1	

Table 40: <eop:Platform> fields description

5.3.5 XML Type: eop:Sensor

The eop:Sensor element contains metadata relative to the mechanism used during the EarthObservation, in particular the metadata describing the sensor used for the EarthObservation. The complete description of the eop:Sensor is given in Table 41.

eop:Sensor			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
eop:sensorType	Sensor type based on codelist. Values: OPTICAL, RADAR, ALTIMETRIC, ATMOSPHERIC, LIMB.	0...1	Yes Used with cardinality 1 Fixed value: "ATMOSPHERIC"
eop:operationalMode	Sensor mode. Possible values are mission specific and should be retrieved using codeSpace. Not used for OMI L1b products	0...1	
eop:resolution	Sensor resolution Not used for OMI L1b products	0...1	

eop:Sensor *(cont'd)*			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
eop:swathIdentifier	Swath identifier. Value list can be retrieved with codeSpace. Not used for OMI L1b products	0...1	
eop:wavelengthInformation/ eop:WavelengthInformation	*Information about the spectral bands* *Not used for OMI L1b products*	*0...1*	

Table 41: <eop:Sensor> fields description

5.3.6 XML Type: eop:Acquisition

The eop:Acquisition element provides the acquisition parameters of the observation. The complete description of the Acquisition is given in Table 42.

eop:Acquisition			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
eop:orbitNumber	Acquisition orbit number	0...1	Yes Used with cardinality 1
eop:lastOrbitNumber	Acquisition last orbit number Not used for OMI L1b products	0...1	
eop:orbitDirection	Acquisition orbit direction Values: ASCENDING, DESCENDING Not used for OMI L1b products	0...1	
eop:wrsLongitudeGrid	Neutral wrsLongitudeGrid to replace track in track/frame, K in K/J, etc. The optional attribute 'eop:codeSpace' is used to point the reference grid Not used for OMI L1b products	0...1	
eop:wrsLatitudeGrid	Neutral wrsLatitudeGrid to replace frame in track/frame, J in K/J, etc. The optional attribute 'eop:codeSpace' is used to point the reference grid Not used for OMI L1b products	0...1	
eop:ascendingNodeDate	UTC date and time at ascending node of orbit Not used for OMI L1b products	0...1	
eop:ascendingNodeLongitude	Longitude at ascending node of orbit. Should be expressed in degrees. Not used for OMI L1b products	0...1	
eop:startTimeFrom AscendingNode	Start time of acquisition in milliseconds from ascending node date Not used for OMI L1b products	0...1	
eop:completionTimeFrom AscendingNode	Stop time of acquisition in milliseconds from ascending node date Not used for OMI L1b products	0...1	
eop:orbitDuration	Actual orbit duration in milliseconds Not used for OMI L1b products	0...1	
eop:illuminationAzimuthAngle	Mean illumination/solar azimuth angle given in degrees (i.e. uom='deg'). Not used for OMI L1b products	0...1	

eop:Acquisition *(cont'd)*			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
eop:illuminatioZenithAngle	Mean illumination/solar zenith angle given in degrees (i.e. uom='deg'). Not used for OMI L1b products	0...1	
eop:illuminationElevationAngle	Mean illumination/solar elevation angle given in degrees (i.e. uom='deg'). Not used for OMI L1b products	0...1	
eop:incidenceAngle	Acquisition global incidence angle given in degrees (i.e. uom='deg'). Not used for OMI L1b products	0...1	
eop:acrossTrackIncidenceAngle	Acquisition across track Incidence angle given in degrees (i.e. uom='deg'). Not used for OMI L1b products	0...1	
eop:alongTrackIncidenceAngle	Acquisition along track incidence angle given in degrees (i.e. uom='deg'). Not used for OMI L1b products	0...1	
eop:instrumentAzimuthAngle	Mean instrument azimuth angle given in degrees (i.e. uom='deg'). Not used for OMI L1b products	0...1	
eop:instrumentZenithAngle	Mean instrument zenith angle given in degrees (i.e. uom='deg'). Not used for OMI L1b products	0...1	
eop:instrumentElevationAngle	Mean instrument elevation angle given in degrees (i.e. uom='deg'). Not used for OMI L1b products	0...1	
eop:pitch	Satellite pitch angle given in degrees (i.e.uom='deg'). Not used for OMI L1b products	0...1	
eop:roll	Satellite roll angle given in degrees (i.e. uom='deg'). Not used for OMI L1b products	0...1	
eop:yaw	Satellite yaw angle given in degrees (i.e.uom='deg'). Not used for OMI L1b products	0...1	

Table 42: <eop:Acquisition> fields description

5.3.7 XML Type: eop:Footprint

The eop:Footprint block contains description of the target location observed during the EarthObservation. The complete description of the Footprint is given in Table 43.

eop:Footprint			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
gml:id attribute	Mandatory identifier required by GML. Its value must be unique among all the gml:id attributes of the XML file. The convention to use the product identifier plus a suffix in order to have the gml:id unique inside the document.	1	Yes Value: eop:identifier + '.FP' as suffix.

eop:Footprint *(cont'd)*			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
eop:multiExtentOf	Acquisition footprint coordinates, described by a closed polygon (last point=first point), using latitude, longitude pairs. Expected structure is gml:Polygon/gml:exterior/ gml:LinearRing/gml:posList. The Polygon geometry shall be encoded in the EPSG:4326 geographic coordinate reference system and the coordinate pairs shall be ordered as lat /lon. Polygons enclose areas with points listed in CCW direction.	1	Yes
eop:orientation	Determines the orientation of the coordinate pairs for the exterior boundary of the footprint polygons. Possible values are CW (clockwise), counterclockwise (CCW) or OTHER (unspecified orientation). Note that this property is only to be provided for footprints that do not follow the normal counterclockwise for exterior boundaries convention as defined in [21]. If the property is not provided, a CCW orientation for the exterior boundary will be assumed. Not used for OMI L1b products	0...1	
eop:centerOf	Acquisition center coordinates Not used for OMI L1b products	0...1	

Table 43: <eop:Footprint> fields description

5.3.8 XML Type: eop:EarthObservationMetaData

The eop:EarthObservationMetaDdata block contains all the metadata relative to an eop:EarthObservation that do not fit inside one of the other blocks, i.e. metadata that do not describe the time, the mechanism, the location or the result of the observation.

These metadata are mainly the EarthObservation identifier, the acquisition type and information relative to the downlink and archiving centers. The complete description of the EarthObservationMetadata is given in Table 44.

eop:EarthObservationMetaData			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
eop:identifier	Identifier for metadata item	1	Yes
eop:creationDate	creation date for the metadata item. When retrieved from a metadata catalog, the creationDate is the date when the metadata item was ingested for the first time (i.e. inserted) in the catalog. Not used for OMI L1b products	0...1	

eop:EarthObservationMetaData *(cont'd)*			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
eop:modificationDate	Date of the last modification to the metadata item. When retrieved from a metadata catalog, the modificationDate is the date when the metadata item was last modified (i.e. updated) in the catalog. Not used for OMI L1b products	0...1	
eop:doi	Digital Object Identifier identifying the product (see http://www.doi.org) Only for OMI L1b radiance and irradiance products. Not used for OMI L1b calibration and engineering data products.	0...1	
eop:parentIdentifier	Collection Identifier See the discussion on gmi:fileIdentifer and Table 5 in Section 5.2.1	0...1	Yes
eop:acquisitionType	Used to distinguish at a high level the appropriateness of the acquisition for "general" use, whether the product is a nominal acquisition, special calibration product or other. Values: NOMINAL, CALIBRATION, OTHER Not used for OMI L1b products	1	Yes
eop:acquisitionSubType	The broad value defined by the acquisitionType is however too restrictive, so mission specific type definition should refer to mission/ground segment dedicated codeSpace Not used for OMI L1b products	0...1	
eop:productType	Describes the product type in case that mixed types are available within a single collection, this is a ground segment specific definition. For OMI L1b products generic product codes are used.	0...1	Yes
eop:status	Refers to product status. Values: ARCHIVED, ACQUIRED, CANCELLED, FAILED, PLANNED, POTENTIAL, REJECTED, QUALITY-DEGRADED (*depricated*) Not used for OMI L1b products	1	No
eop:statusSubType	Refines the status of a product when the "status" is set to "ARCHIVED". Values: ON-LINE, OFF-LINE Not used for OMI L1b products	0...1	
eop:statusDetail	This field refers to the eop:status value. It should be used to motivate the reason of a failure, cancellation, rejection or degraded quality. Not used for OMI L1b products	0...1	
eop:downlinkedTo/ eop:DownlinkInformation	*Downlink information* Not used for OMI L1b products	*0...1*	

eop:EarthObservationMetaData *(cont'd)*			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
eop:archivedIn/ eop:ArchivingInformation	*Archive information* Not used for OMI L1b products	*0...1*	
eop:productQualityStatus	Indicator that specifies whether the product quality is degraded or not. This optional field shall be provided if the product has passed a quality check. Values: DEGRADED, NOMINAL Not used for OMI L1b products	0...1	
eop:productQuality-DegradationTag	Contains further textual information concerning the quality degradation. It shall be provided if eop:productQualityStatus value is DEGRADED. Possible values are mission specific and should refer to mission/ground segment dedicated codeSpace. Example of values could be "RADIOMETRY" or "GEOLOCATION". Not used for OMI L1b products	0...1	
eop:productQuality-ReportURL	URL reference to an external quality report file Not used for OMI L1b products	0...1	
eop:productQuality-Degradation	Quality degradation percentage (i.e. uom='%') Not used for OMI L1b products	0...1	
eop:productQuality-DegradationQuotationMode	Indicator to know how the quality degradation percentage has been calculated. Values: AUTOMATIC, MANUAL Not used for OMI L1b products	0...1	
eop:histograms/ eop:Histogram	*Histograms* *Not used for OMI L1b products*	*0...n*	
eop:composedOf	Link to an EO product that is part of this EO product Not used for OMI L1b products	0...1	
eop:subsetOf	Link to the "father" EO product Not used for OMI L1b products	0...1	
eop:linkedWith	Link to another EO product Not used for OMI L1b products	0...1	
eop:processing/ eop:ProcessingInformation	*Processing information*	*0...n*	Yes See section below on eop:Processing Information
eop:productGroupId	Holds the identifier of a particular group to which the product belongs to. Group members represent then "granules" or "portions" of end-user products that are eligible for specific aggregations Not used for OMI L1b products	0...1	

eop:EarthObservationMetaData *(cont'd)*			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
eop:vendorSpecific/ eop:SpecificInformation	*Container for ad-hoc metadata that does not merit a mission specific schema or extension* Not used for OMI L1b products	*0...n*	

Table 44: <eop:EarthObservationMetaDdata> fields description

5.3.9 XML Type: eop:ProcessingInformation

The eop:ProcessingInformation element provides information about the processing date, methods and processing center. The complete description of the eop:ProcessingInformation is given in Table 45.

eop:ProcessingInformation			
Field name	**Field description and OMI notes**	**Card'ty**	**OMI tailoring**
eop:processingCenter	Processing center code. Possible values are mission specific and should be retrieved using codeSpace. Set by the processing center through the job order	0...1	Yes Used with cardinality 1
eop:processingDate	Processing date time	0...1	Yes Used with cardinality 1
eop:compositeType	Type of composite of product expressed as time period that the composite product covers Not used for OMI L1b products	0...1	
eop:method	Method used to compute datalayer. (e.g. Kalman filtering, ROSE) Not used for OMI L1b products	0...1	
eop:methodVersion	Method version (e.g. 1.0) Not used for OMI L1b products	0...1	
eop:processorName	Processor software name Set by the processing center through the job order	0...1	Yes
eop:processorVersion	Processor software version (e.g. 1.0) Set by the processing center through the job order	0...1	Yes Used with cardinality 1
eop:processingLevel	Processing level applied to the product	0...1	Yes Fixed value: L1b
eop:nativeProductFormat	Native product format	0...1	Yes Fixed value: NetCDF-4
eop:auxiliaryDataSetFileName	Name(s) of auxiliary dataset(s) used in the process Not used for OMI L1b products	0...n	
eop:processingMode	Processing mode taken from mission specific code list. Set by the processing center through the job order	0...1	

Table 45: <eop:ProcessingInformation> fields description

5.4 ECS metadata profile for OMI

The ECS metadata relates to the information for archiving in the NASA EOSDIS. The metadata provided is a subset of the metadata that was provided in the collection 3 OMI L1b data products. The metadata is split into *Collection Metadata*, which describes the dataset series (product collection) and the *Inventory Metadata*, which describes the individual datasets (products).

Collection_Metadata		
Name	**Class**	**Definition**
ShortName		Shortname identification of the product collection *Example: "OML1BRVG"*
VersionID		VersionID identification of the product collection *Example: "004" for collection 4 L1b data products*
ProductionVersion		Product version, combination of the VersionID and a minor version number, as set by the processing center through the job order
LongName		Longname identification of the product collection *Example: "OMI/Aura Level 1B VIS Global Geolocated Earthshine Radiances"*
CollectionDescription		Description of the product collection *Example: "OMI Geolocated Earth Radiances from Visible Channel (350–500 nm)"*
ProcessingCenter		Identification of the facility where the data is processed *Fixed value: "NASA-OMI-SIPS"*
ArchiveCenter		Identification of the facility where the data is archived *Fixed value: "NASA-GES-DISC"*
ContactOrganizationName		Contact information for user support *Fixed value: "GES DISC HELP DESK SUPPORT GROUP"*
ContactOrganizationPhone		Contact information for user support *Fixed value: "301-614-5224"*
ContactOrganizationEmail		Contact information for user support *Fixed value: "gsfc-dl-help-disc@mail.nasa.gov"*
ECSDisciplineKeyword		Keywords for describing the product collection *Fixed value: "Earth Science"*
ECSTopicKeyWord		Keywords for describing the product collection *Fixed value: "Atmosphere"*
ECSTermKeyWord		Keywords for describing the product collection *Fixed value: "Atmospheric Radiation"*
ECSVariableKeyword		Keywords for describing the product collection *For example: "Radiative Flux"*
ProcessingLevelDescription		Description of the processing level *For example: "Level 1B Radiances"*
ECSTermKeyWord		Identification of the processing level *Fixed value: "1B"*
PlatformShortName		Platform description shortname *Fixed value: "Aura"*
PlatformLongName		Platform description longname *Fixed value: "EOS Aura Mission Satellite"*
PlatformType		Platform description type *Fixed value: "Spacecraft"*
InstrumentShortName		Instrument description shortname *Fixed value: "OMI"*
InstrumentLongName		Instrument description longname *Fixed value: "Ozone Monitoring Instrument"*

Collection_Metadata *(cont'd)*		
Name	**Class**	**Definition**
InstrumentTechnique		Description of the instrument's measurement technique *Fixed value: "Nadir-Viewing Cross-Track Imaging Spectroradiometry"*
InstrumentSensor	Sensor	Description of the instrument's sensors (for content see below)

Table 46: Collection_Metadata class.

Collection_Metadata.InstrumentSensor > Sensor		
Name	**Class**	**Definition**
SensorShortName		Sensor description shortname *For example: "CCD Visible"*
SensorLongName		Sensor description longname *For example: "Charge Coupled Device Visible"*
SensorTechnique		Description of the sensor's measurement technique *For example: "Frame Transfer CCD Imaging Spectroradiometry"*
SensorWavelengthRange		Description of the sensor's wavelength range *For example: "350-500nm"*

Table 47: Collection_Metadata.InstrumentSensor

Inventory_Metadata		
Name	**Class**	**Definition**
ShortName		Shortname identification of the product collection *Example: "OML1BRVG"*
VersionID		VersionID identification of the product collection *Example: "004" for collection 4 L1b data products*
ProductionVersion		Product version, combination of the VersionID and a minor version number, as set by the processing center through the job order
GranuleID		Logical and unique identification of the product (i.e. the product filename) *Example: "OMI-Aura_L1-OML1BRVG_-2011m0720t0213-o037292_v0401-2021m0303t1441.nc"*
ProductionDateTime		Date and time that the data product was produced *Example: "2021-03-03T14:41:21Z"*
OrbitNumber		Orbit number of the data covered by the product
RangeBeginningDateTime		Start date and time of the data granule covered by the product *Example: "2011-07-20T02:13:15Z"*
RangeEndingDateTime		End date and time of the data granule covered by the product *Example: "2011-07-20T02:13:15Z"*
PGEVersion		Version of the OMI L01b processor *Set by the processing center through the job order*
ProcessingMode		Processing mode *Value: "PDS" or "RBDS"*
Format		Format of the data product *Fixed value: "NetCDF-4"*

Inventory_Metadata *(cont'd)*		
Name	**Class**	**Definition**
identifier_product_doi		doi for the data product, if applicable
DayNightFlag		Specifies if data was collected on day or night side *Fixed value: "Day"*
AssociatedPlatformShortName		Shortname identifying the platform *Fixed value: "Aura"*
AssociatedInstrumentShortName		Shortname identifying the instrument *Fixed value: "OMI"*
EquatorCrossingLongitude		Longitude (degrees) of the ascending node crossing of the orbit covered by the data product *Example: "161.95"*
EquatorCrossingDateTime		Date and time of the ascending node crossing of the orbit covered by the data product *Example: "2011-07-20T02:55:52Z"*
gmd:lineage	gmd:LI_Lineage	Lineage of the data product in accordance with Table 27

Table 48: Inventory_Metadata class.

5.5 CF/NetCDF metadata profile for OMI

The CF-Metadata conventions [6] and the Attribute Conventions for Dataset Discovery (ACDD) [10] recommend a comprehensive set of attributes to be included as metadata elements. However, many of the metadata attributes proposed by CF-Metadata Conventions and ACDD overlap with the ISO 19115-2 standard and hence the same information can be found in these metadata.

In view of the above, only a very limited set of metadata elements recommended by CF-Metadata Conventions and ACDD is used. More detailed information on the specific elements included in the OMI L1b products can be found in [7].